cq-tv

SUMMER

1959

40

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EDITORIAL

One outstanding feature of this edition of CQ-TV and the last edition is the complete absence of photographs apart from the front cover. I would like to make a special request for photographs of all kinds - Group meetings, gear under construction and completed, records of demonstrations, exhibitions and results. Photographs can be any size, preferably Photographs can be any size, although the larger the better. Negatives are most convenient and will be treated with care and returned.

This year's Radio Hobbies Exhibition will be held on Wednesday, Thursday, Friday and Saturday 25th to 28th November. At the time of going to press it is unknown whether BATC will be there or not. However, a supplementary note will be sent out with CQ-TV with more details. Admission will cost 2s 0d, and the exhibition will be open from 11.00 a.m. to 9.00 p.m.

News of members activities is always welcome, whether for mention in CQ-TV or not. The Chairman, Secretary and Editor all have tape machines and can handle tapes at 5$\frac{3}{4}$"/second or 7$\frac{1}{2}$"/second. Any members interested in exchanging message tapes are invited to send names and details of speeds etc so that a list can be compiled.

Since the last edition went to press more news has come through about Vidicon tubes. The offer of tubes complete with yokes still stands at £25, but the yoke may now be bought separately for £15, and the tube alone for £15

The club has been given a stock of narrow angle scanning yokes. These are available to club members free of charge apart from postage costs.

73,

John Tanner

G3NDT/T

Mc/s, mA and pFs.

In the previous article, it was shown that Rise Time(μS) x Bandwidth (Mc/s) = 0·35 approx. Another fundamental relation will now be discussed ; it applies to all valve or transistor circuits.

An electrostatics equation relating to capacitors states that Q = CV, where Q coulombs = quantity of charge stored ; C farads = capacitance, and V volts = P.D. across the capacitor. Now consider that we want to raise the P.D. by δV (delta V) volts ; to achieve this, we must add more charge, oQ coulombs say, such that δQ = CδV.

Suppose, in addition, that we require to raise the capacitor P.D. by δV volts in a given time, δt seconds. Since δQ = CδV, we can divide each side of this equality by δt, to give $\frac{\delta Q}{\delta t} = C \frac{\delta V}{\delta t}$.

But δQ/δt is Quantity/Time, or rate of movement of electrical charge ; this represents a current which we can call i amps. So $i = C \frac{\delta V}{\delta t}$, or $\frac{\delta V}{\delta t} = \frac{i}{C}$.

In units of practical value,

$$\frac{\delta V}{\delta t} \ \frac{\text{volts}}{\mu S} = 1000 \frac{i}{C} \frac{mA}{pF} .$$

Now how can this formula be used in video amplifier design ?

If we consider the anode circuit of an amplifier stage V1 in Fig.3, the capacity C to earth at this point is given by the sum of the following items, which are all in parallel as far as high frequencies are concerned : Co - output capacitance of V1 ; Cs - wiring strays and capacity to earth of the coupling components ; Cb - valve base capacity ; and Cin - input capacity of the following stage, V2. (N.B. Miller effect if V2 is a triode)

The following are typical values when V1 and V2 are both EF91s : Co 2pF ; Cb 2 x 2pF (for black P.F. bases) ; Cs 10pF ; Cin 7pF. Total C = 23pF. Careful wiring may reduce this to less than 20pF, but long leads may easily bring the total to more than 30pF.

Now if we require, say, a 100 volt amplitude pulse out of the anode of V1 in 0·1μS, then we can use the formual developed above to calculate the current i which must be supplied by the valve in order to charge up the anode capacitance at the required rate.

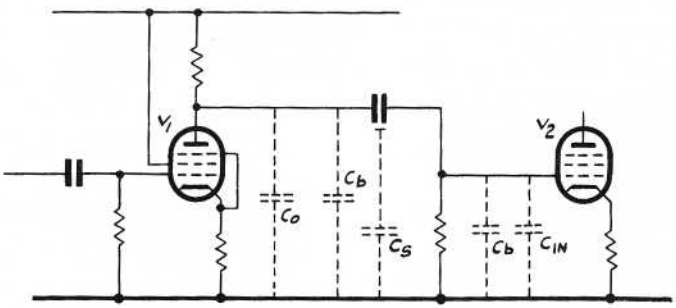
$$i \text{ mA} = \frac{C \text{ pF} \times \delta V \text{ volts}}{1000 \times \delta t \ \mu S} = \frac{23 \times 100}{1000 \times 0{\cdot}1}$$

= 23 mA.

If the output is a positive going pulse, this is the current required to charge the anode capacitance ; if negative going, then the 23 mA represents the necessary discharge current which must flow through the valve.

This applies to cathode followers as well as voltage amplifiers - in practice , a cathode follower is better as a high level video output stage. As it has a low output impedance, the frequency response is less affected by a given capacitative load - but note that our formula must still be obeyed. If a cathode follower has to handle too large a capacitative load, it will certainly cause distortion of the higher video frequencies.

The moral of all this is that we should use "beefy" valves running at reasonably high anode currents in stages which are required to deliver high amplitude fast going pulses e.g. in a modulator, or a stage feeding a C.R.T. However, we can economize in the use of H.T. current by connecting valves as "shunt regulated" amplifiers or cathode followers ; these circuits will be described in a future article.



A SIMPLE PAN & TILT HEAD

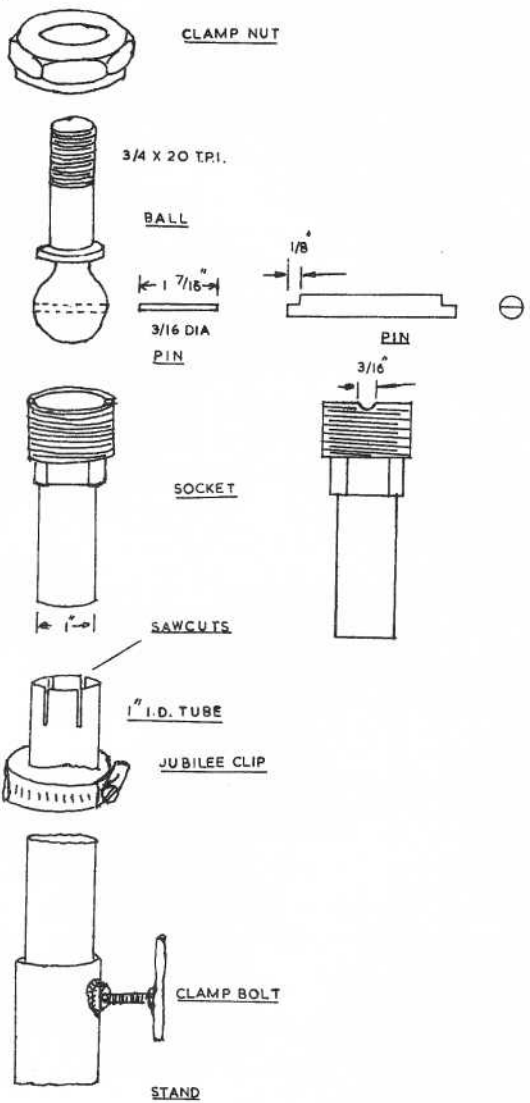
BY MICHAEL COX

A problem which besets most of us who are building live camera channels is that of finding a suitable mounting for the camera. Such a mounting is a Pan and Tilt head, and this device provides a means of rotating the camera about a vertical axis and at the same time tilting it about 30 degrees above and below the horizontal. Professional heads are usually very complicated pieces of machinery and have provision for clamping the camera in any desired position, they are also very heavy, in fact two men are required to lift the type used on some of the colour TV cameras!

The types of head that can be pressed into service vary from the simple ball and socket as used on small photographic cameras (possibly suitable for a small Vidicon unit) to the heavier 35 mm cine camera types, suitable for the larger Image Orthicon, C.P.S.Emitron or Iconoscope cameras.

When faced with the need for a head to take a 5527 camera, weighing about 20 lbs, the idea of an elaborate unit was dropped due to lack of workshop facilities and time. The idea of using a ball joint appealed and a search was started for a suitable one. Eventually one was bought for about 30/- ($4.00) This was the type used as standard motor cycle side car fixings. The trick to make it suitable for a camera is in the pin which goes through the center of the ball and rests in grooves filed in the edge of the socket. This pin provides the tilt axis and eliminates any tendency to fall sideways. The panning action arises because the stem of the ball socket is 1 inch diameter and fits into a piece of 1 inch inside diameter tubing. This tubing in turn fits into the main column of the camera stand and can be fixed at any height by means of a simple screw clamp. The camera is fixed to the head by means of a nut welded to a plate, in turn bolted to the bottom of the camera.

The pin can be made from 3/16 inch silver steel with the ends filed as shown in the drawing. A pad of greased felt in the socket helps to ensure a smooth tilt action, and a film of grease on the lower part of the socket ensures a smooth panning action. As the weight of the camera is supported on the top of the 1 inch tube it is a good plan to use a tube with walls as thick as possible, this will also help to keep the whole assembly rigid. The purpose of the sawcuts in the top of the tube is to enable the Jubilee clip to draw up the tube to give a smooth action without any side play. If a knob is fitted to the screw head on the clip, then the device may be used to clamp the head in any desired position. A suitable bolt through a tapped hole on to the ball



could do the same job for the tilt axis. In order to ensure that the head fits on to the camera at right angles, a lock nut is fitted to the threaded stem of the ball. It may prove difficult to obtain an exactly similar ball and socket to the original, but the only difference is likely to be in the stem below the socket and this can be looked after by a different size tube.

FOR SALE.....

W.H.Armstrong at 'Wycherley', Balmoral Gap, Hastings, Barbados, B.W.I. has for sale a C 592 Staticon (Standard Vidicon) complete with deflection coils, focus coil, base and target connector and horizontal scan output transformer. £55 ($100) or offers.....

WHAT THE OTHER CHAP IS DOING

First of all, here is some news of North American activities, passed on by Mike Barlow ; it arrived just too late for CQ-TV 39, so please excuse any out of date items! In Montreal, Mike has been building a new oscilloscope based on G3KOKs circuit in CQ-TV 31 ; he quotes a very useful reference for CRO circuitry in Mullard Tech. Comm. Aug.1958. (Incidentally, there are circuits for line and frame magnetic timebases in Mullard Tech.Comm. May 1959). Mike had a visit from founder member Hendrik de Waard PAØZX, passing through Montreal on his way back from the USA. PAØZX has had little spare time recently, but has a vidicon in readiness for camera construction in the future. Derek Whitehead, working on the DEWline radar project (in temps. 55 below zero!) is another member who has been too busy for ATV work. He is due for leave soon and will repair to Wales for a couple of weeks. He hopes to do some transistor work, but in the meantime offers his services to anyone interested in slow scan transatlantic TV. He has Collins receivers and Tektronix scopes ; contact him as 79616, c/o Federal Electric Co., Dorval Airport, Montreal. Bill Horton (Monticello, New York) has a $45 iconoscope in action, and a slide scanner using 3FP7. Nigel Nathan (Dundas,Ontario) has just completed a scope. Mike Sendecky has been studying hard for entry to Trenton Univ. this year - good luck, om.

Peter Glisch (Milwaukee) has tried a new pre-amp. using a 6BZ7 cascode in his camera ; the idea came from W9ZDY, and Pete finds it a great improvement over his old circuit. Chuck Nash W6AZI (West Covina, California) has been working on ATV for 10 years - he started with a 5527 and now has an 1849 iconoscope on the air with "flea power" - a pair of 6AF4s cathode modulated by 6AU6. He has all the bits, apart from a socket, for a vidicon camera ; he is interested in slow scan TV.

Mike sent out a 525 line BATC newsletter to all members in N. & S. America, and asks anyone who missed it to contact him at 1740 Hartenstein St., St.Laurent, Montreal.

Lewis Duncan, a new member from Fife, is building a FSS, using a 5FP7 and 931A. He has been interested in TV since the days of the 30 line BBC transmissions. We have no news of our other Scottish members - what about it, lads ? Eric Walton, RAF Amateur TV Society, Weston-super-Mare, sends news that the Soc. has a FSS in action, and a transmitter almost complete ; they also have a vidicon camera under construction. The major difficulty is that membership fluctuates as men are posted ; however, Eric reports keen activity at present. G. Russell W2SJU (New Jersey) sent a most interesting letter ; he considers the three essentials for an amateur TV system to be low cost, simplicity and flexibility. He wanted information on scan and focus coil winding for a vidicon, so he should find CQ-TV 33 of help.(There are still some copies of No.33 available, for those who require vidicon coil winding data).

K.Whittaker (Ghana), who is a lecturer at the College of Technology,Kumasi, has recently bought a vidicon and set of scan and focus coils ; we look forward to hearing news of his camera. J.Gaule (Ireland) asks which surplus units are of most use for amateur TV - the APQ-2, APQ-9 and APN-4 are handy sources of components for 70 cm. work, flying spot scanners or pulse generators. Peter Boulden (Penzance) has been busy building a FSS and a vidicon camera, for a demonstration in conjunction with a local radio shop. The Cambridge group is thinking of re-building the transmitter used in Matilda, writes Mike Soames, though exams have slowed down the work.

COLOUR NOTES

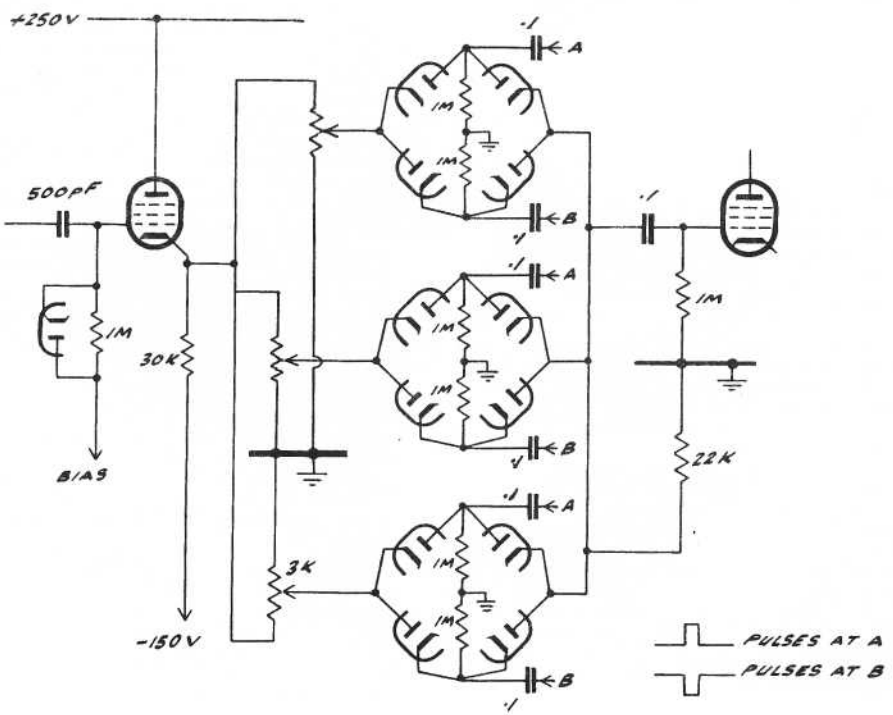
by C.G.Dixon.

There has been a growing interest in Colour Television recently and one or two members have expressed the intention of building colour cameras; the following notes are based on 5 or 6 years of experience with colour gear of the frame sequential type. They are by no means exhaustive and the editor would be glad to hear from other members if they can throw any light on this fascinating subject.

Standards These were discussed in the last edition of CQ-TV and the findings were that a frame frequency of at least 100 cycles/second is necessary to avoid flicker with a reasonably bright picture. Flicker increases with the brightness of the picture, and the flicker frequency is the colour repetition frequency, that is 33⅓ cycles with the 100 cycles frame frequency. Mains hum must be rigidly excluded from all circuits! Line frequency, 15.75Kc/s double interlaced gives a 315 line picture.

The pictures shown at the last convention were 150 line sequential scanning but the equipment is being converted to give the interlaced picture. For colour sequence both Jack Terry and I use Red: Green: Blue; in that order.

Colour Control Those camera tubes which have not got a stabilised black level (Iconoscope type tubes) need separate 'gain' and 'lift' controls for each colour. Where the camera tube delivers a stable black level, only 'gain' controls are required. A master gain is also necessary and the gain should be linear in each channel, otherwise operation of the master gain control will cause colour differences in the picture! Gating pulses to separate the three colours are generated by a ring counter using three triodes with a further three acting as phase splitters. (see CQ-TV 21) The positive and negative pulses from these phase splitters are used to open three bridged diode gates in sequence...fig 1.



This is an improvement on the circuit shown in CQ-TV 21, it was found that the lift controls are not necessary with the C.P.S. Emitron. (An improved version of the Orthicon tube) A three tube self running multivibrator might be used instead of the ring counter (Electronic Engineering Feb. 1958), in this case it would be possible to synchronise it with a colour indexing pulse at one third frame frequency.

Gamma If the signal from the camera is not gamma corrected then the system will only give good pictures from scenes where the three colour components are almost the same level...it will be very touchy as to subject! The gamma correcting stage should precede the colour control in the chain.

Camera Disc This normally consists of a 12 sector disc of such a diameter that the width of one sector is just about equal to the vertical height of the photocathode. It should be run as close to the photocathode as possible and driven by a synchronous motor at such a speed that the scanning line which traverses the photocathode just precedes the division between the colour filters. This means that if, say, the red picture is being scanned off by the beam in the camera, the photocathode is immediately exposed to the following colour...green. This is necessary as the camera tube is a storage device..fig 2. Exact control of speed and phase is necessary in the camera. I use a synchronous motor running at 1500 r.p.m. and a 5:1 step down chain drive (no slip) to give exactly 500 r.p.m. The phase is altered by keeping the motor phase fixed and varying the phase of the AC reference signal in the timing unit of the sync generator. This gives a variable phase frame sync. pulse. The disc itself should not be made of metal as the spokes, or the eddy currents flowing in them, may disturb the magnetic focussing field in the vicinity of the photocathode. Similarly Perspex should not be used for the disc as it acquires electrostatic charges due to friction in the air. Laminated plastics such as Tufnol are quite all right and the colour filters may be fixed in with water soluble glue.

Experience shows that if Durofix or any adhesive with a plastic base is used, then in due course the filters buckle and distort. The filters used are ordinary stage lighting ones of the cellulose acetate type..colours, Primary Red, Primary Green, Primary Blue. For the camera disc, examine each section of the filter for flaws by looking at a distant object through it and use only the best parts. The presence of the large electric motor in the camera is apt to create disturbing magnetic fields near the camera tube and this should be well screened magnetically. It might be possible to mount the motor, if small enough, in front of the disc on the 'nose' of the camera. The motor also makes the colour camera heavy and a good stout tripod and pan & tilt head is needed. Vidicon tubes are characterised by a definite lag and it is not generally possible to scan off the whole picture in one frame, hence they are not suitable for a frame sequential system. It might be worth trying to use one for colour telecine as the extra light from the projector will certainly reduce the lag.

Viewing Colour Pictures There are two types of colour monitor...the single tube and the three tube. As the special colour tubes are not generally obtainable, a standard black and white tube must be used with a mechanically rotated colour disc, cone or drum. This must move in step with the disc in the camera and a synchronous motor or servo speed control system must be used. The phase is not so critical as in the camera and it is usual to use a 6 sector disc

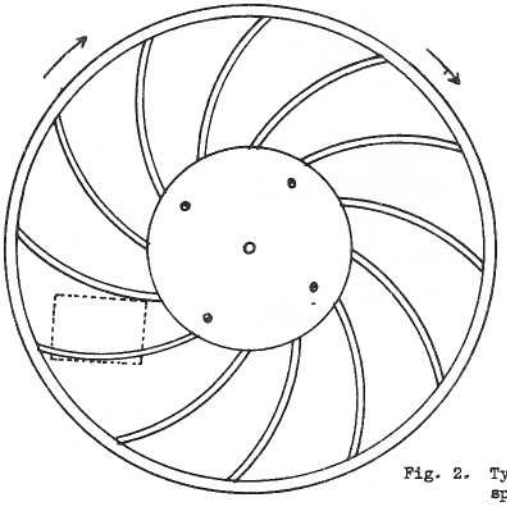


Fig. 2. Typical camera disc. Shape of spokes depends on relative positions of axle and photocathode. Remember, camera lens inverts the picture on the photocathode, hence disc rotates upwards.

rotating at a higher speed. Jack Terry has constructed a magnificent 14" monitor with the tube mounted inside a colour drum. For compactness I use a 5" tube with a 15" dia. disc. A projection tube would enable a smaller disc to be used and perhaps a neater unit. The three tube monitor can use three projection tubes all throwing pictures on the same screen, or it can use three direct view tubes with the images optically combined. Apart from the difficulty of scanning three tubes with exactly equal waveforms, the projection system requires keystone correction waveforms to be added to two of the projectors. The direct viewing unit requires careful mechanical adjustment of the three tubes for exact superimposition of the three images. For frame sequential purposes the three tubes are fed with blanking pulses such that the displayed pictures are seen in sequence. Dichroic mirrors are used commercially for colour splitting (these reflect one colour and pass the rest) but they are prohibitively expensive; the alternative is to use half silvered mirrors and colour filters but this results in a considerable loss of light. For simplicity therefore a colour disc monitor is to be preferred although the three tube systems have the advantage that they are easily adaptable for reception of simultaneous transmissions by the omission of the sequential gating pulses. Alternatively the simultaneous transmission may be viewed on a sequential monitor, but then the flicker will be $\frac{1}{3}$ frame frequency which is $16\frac{2}{3}$ cycles on the the British 405 line system. This is too low a value for a picture with a reasonable brightness.

What the Other Chap is doing.

(Continued from page 4)

Marcos Huller (Buenos Aires) is constructing a vidicon camera ; he does not know of any other TV amateur in Argentina, and so finds CQ-TV a useful source of ideas.

We are very sorry to learn that Rex Lakeman has been confined to bed for some time, following an accident - get well soon OM. Rex reports that Ken Cooper paid him a visit, to pass on the news that the High Wycombe group have almost completed their Mark II vidicon camera - an improved version of their original. They are also paying careful attention to the audio as well as the video side. Full marks, men - too often, the audio side is overlooked at shows and exhibitions.

T.W.Luxford (Chingford) has now got his licence G3MUB/T, and is collecting gear for his station. Ron Bassett informs us of much activity in the Bournemouth area - several shows are planned for this year, and a FSS and at least one vidicon camera forms the equipment available. J.Millns is hoping to receive Ron's transmissions ; he has just completed a 14" receiver with all the trimmings (AGC on picture and sound).

And that completes the news for this issue - do remember, we rely on YOU for all the news published here, so please send the gen on your activities along to Don Reid.

READING LIST

5/- or less

TV Circuit Refinements	Banthorpe
TV Timebase Circuits	Banthorpe
TV Receiver Practice	Holland
TV Sync Separators	Patchett
Introduction to Amateur TV	Barlow

5/- to £1

Introduction to Colour TV	Gouriet
Elements of Pulse Circuits	Farley
Industrial TV	McGhee
TV Convention, 1952	I.E.E. Vol.IIIA
(in 4 parts, each about £1)	

£1 to £2

TV Receiving Equipment	Cocking
Time Bases	Puckle
BBC TV Engineering	Amos & Birkinshaw
(in 4 volumes, each about 30/-)	

£2 to £4

TV Engineering	Fink
Vacuum Tube Amplifiers Vol.18	M.I.T.
Waveforms Vol.19	M.I.T.
Practical TV Engineering	Scott Helt
Television	Kerkhof & Werner
Theory & Design of TV Receivers	Deutsch
Fundamentals of TV Engineering	Glasford
Basic TV	Grob

Over £4

TV Engineering Handbook	Fink
Television	Zworykin & Morton
Pulse & Digital Circuits	Millman & Taub

SLOW SCAN TELEVISION

by J.A.Plowman, G3AST

Because several of the experimental circuits referred to in this article were still being tidied up at the time of going to press they have been held over to the next edition.

The important point of this article is to invite comment and suggestion before any definite standards are settled. Please send any comments either to G3AST direct at: 9, East Coker Rd , Yeovil, Somerset or to the Editor.

J.E.T.

The system outlined falls into three or four major groups. These can be briefly described quite separately as no significant problems are predicted with their integration.

a) F.M. Convertor:

The object of this is to convert the amplitude signals into wide band frequency modulation. A resting carrier frequency of 9 kilocycles is chosen and the swing at maximum deviation is 5 Kc/s either side of this mean. Whilst the method of detection proposed allows quite a wide scatter in carrier frequency and deviation ratios, it would be an advantage to establish some reasonable standard. The circuit constants provided are for the above mentioned circuit constants being worked on at the moment are for the above mentioned characteristics.

A 12BH7 twin triode multi-vibrator is used with the grid returns connected to a point of varying voltage. Swinging the grid returns from ground to HT rail will provide a 3 to 1 carrier frequency ratio and an adequate swing is obtained by using an EL91 modulator stage. As scanning equipment was not available at this early stage a two valve pre-amplifier was constructed and experiments conducted recording speech and waveforms which were later discriminated and studied on an oscilloscope. The circuits to be described will give a response from DC to 2.3 Kc/s although a steady but gentle droop is evident from about 1 Kc/s onwards. This is only due to the fact that simple integration networks are used in lieu of a low pass filter at the discriminator end Members having access to inductors might like to design a low pass filter with a cut off frequency of 4 Kc/s.

b) F.M. Discriminator:

The system currently devised is for use with any good tape recorder for domestic use. The discriminator circuit is therefore designed to work from the extension speaker terminals and is, therefore, at low impedance (15 ohm). The input voltage, presumably at 15 ohms, is fed into a small replacement type loud speaker transformer which is used backwards. The secondary (formerly primary) is connected across two back to back clipping diodes which are connected in series with a limiting resistor. At 20 volts RMS and above a very clean clipping action is obtained and the constant amplitude square wave is fed to a single pentode voltage amplifier. This amplifies the square wave which is rather less than 1 volt peak to peak and supplies a twin diode storage type counter discriminator. The output from the discriminator works into 1 megohm and has quite adquate voltage for feeding to a Williamson amplifier. (This was the original set up for the early objective tests in conjunction with voice recordings).

Reproduction using this system is surprisingly good but in view of the frequency coverage the reproduction sounds somewhat unnatural. Distortion of a simple sinusoid is undetectable on an oscilloscope and even a square wave is quite acceptable, although both these waveforms suffer from a certain amount of carrier clutter.

c) Line and field Sweep Generators:

The problem with the line scan circuit is to produce a linear sawtooth current at 25 cycles per second (with provision to run at 20 c.p.s as used by WA2BCW) into the 5 ohm scanning coils; two sets of coils being used, one for the scanner and the other for the monitor. By using considerable negative feedback over the output stage and a positive feedback shaping circuit, a satisfactory trace has been obtained although the circuit is rather critical.

In the field scan circuit a constant current pentode and a gas tetrode generate a high power saw tooth which is directly coupled to a 6V6 cathode follower. The development model of this circuit is not too critical and operates at 1/4 or 1/5 cycle per second, and like the line circuit, will drive two sets of coils.

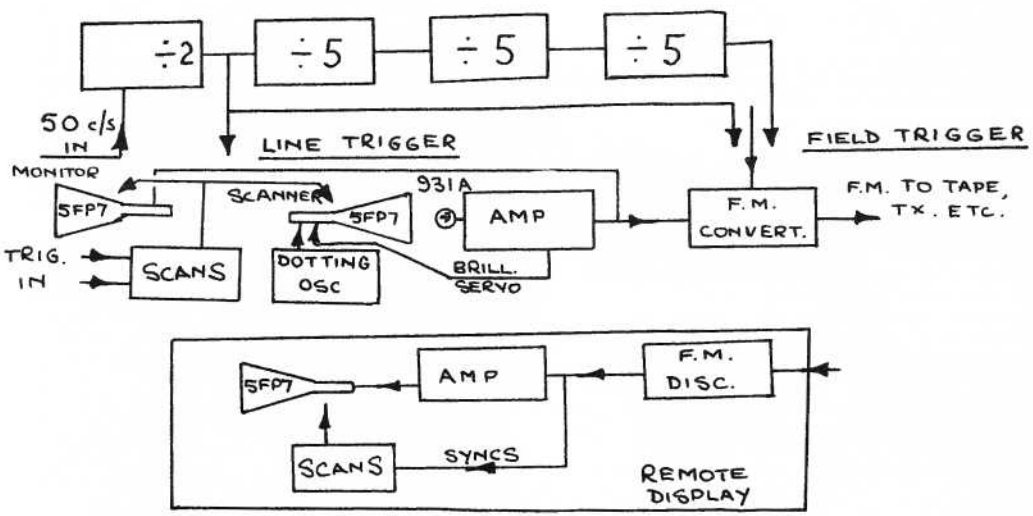
d) Trigger Generators and Divider Stages:

With the approval of the Chairman, it is hoped that low frequency scanning can be developed in two stages. Firstly, the interim standard, using 125 lines with a read out time of 5 seconds, later, 250 lines with a 50-50 interlace. The trigger and divider stages to be outlined are designed to be compatible with either system with the minimum of circuit alterations. A 6.3 volt heater, one side earthed, is connected to the grid of the squaring stage via a limiting resistor. The output of this stage is sharply differentiated and fed to an Eccles Jordan flip flop which divides by two. The following three stages are identical except for "C" and "R" and each divide by 5. These stages are mono-stable and have proved, on an experimental basis, to be far superior to any other counter configuration, bearing in mind the low frequencies involved.

The 50 cycle differentiated pulse is not used in the interim standard but will later be employed as a half line pulse. The output from the Eccles-Jordan triggers the line oscillator and the third univibrator triggers the field sweep generator. Some patience is required to set up a 5 second counter, as it is rather a long time to wait to find whether the vertical saw-tooth generator is locking too early or not. The line and field sync generators are still currently under development.

e) The scanning circuits will comprise two 5FP7 flat face cathode ray tubes, one for scanning and the other for monitoring. The scanner tube is pigmented blue and the monitor tube coloured yellow/orange for obvious reasons. The scanning raster is broken up by means of a dotting oscillator and the output from the photo-multiplier connected to two pentode stages in cascade followed by a long tailed pair, and feeds an output stage (a cathode follower). The output from the cathode follower is fed back (as negative feed back) to the scanning tube in order to produce a closed brilliance servo loop. A complimentary image will appear on the face of the scanning tube which is connected, in parallel, with the monitor. Such means will provide superior gradation and quality yet be reasonably independant (provided the loop gain is high enough) of variations and wander in circuit parameters.

This particular aspect of the system has not reached the practical stage at the time of writing.



Front Cover picture shows a picture from GW5JGA/T's Flying Spot Scanner.

NEW MEMBERS

B.T. Baker, 192 Bourne Vale, Bromley, Kent.
K.D. Baker, VE5XX, P.O.Box 755, Weyburn, Saskatchewan, Canada.
F.A. Boivin, 777 Osborne Avenue, Verdun, Quebec, Canada.
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D.F. Freeman, 14 Riversdale Road, Chilwell, Geelong, Victoria, Australia.
J. Gaule, 5 Michael St., Waterford, Ireland.
B.E. Gillingwater, 79 Lancaster Road, Gt. Yarmouth, Norfolk.
F.R. Heselton, Jr., 1201, Minneapolis Ts., Sault Ste. Marie, Mich., U.S.A.
C. Hunt, P.O.Box 726, Lacombe, Alberta, Canada.
D.N. Irwin, VE3AXH, 415 Charles Street, Sault Ste. Marie, Ontario, Canada.
D. E. Jackson, 114 Main Road, Broomfield, Chelmsford, Essex.
J. Klasz, 771 Bannatyne Avenue, Winnipeg 3, Manitoba, Canada.
T.R. Little, Brenva, Rhuddlan, Flint,N.Wales.
D.H. McClelland, G2FVA, 54 Ulster Avenue, Shoeburyness, Southend-on-Sea,Essex.
H. Megard, 4 Ave.Edouard Baud, Chene-Bourg, Geneva, Switzerland.
T. Parton, G2AGK, 718a Alum Rock Road, Ward End, Birmingham, 8.
D. Pratt, G3KEP/T, "Glenluce", Lyndale Road, Eldwick, Bingley, Yorkshire.
R.C. Prout, VK2CN/T, 9 Agnes Street, Mayfield, Newcastle, N.S.W., Australia.
B.A. Robinson, 34 Bunty Lane, Willowdale, Ontario, Canada.
G.H. Russell, W2SJU, 20 Aldrich Avenue, Metuchen, New Jersey, U.S.A.
I.R. Scott, 20 Belmont Gardens, Edinburgh, 12.

THIS MONTHS PROBLEM You came up with some good ideas for the 1 volt calibrator, so now try this one. Both 525 and 625 line systems use FM sound. For amateur use a subcarrier at 4.5 or 5.5Mcs can be used, but this must be frequency modulated. Bill Still in CQ-TV 56 showed how it can be done classically using a reactance tube, but can you improve on this with modern magnetic materials, varicapacitors (Ital diodes), etc? The components you use must be cheap and obtainable anywhere in the world - and you'll have to use less tubes than Bill did! 50 or 75kc/s deviation is needed.
On the subject of varicaps, the BB76 changes from 3 to 15pF as the bias changes from 0 to 20volts. C is usually proportional to $1/V^2$ and the device will work from DC to 500Mcs or so.

GROUP NEWS

Brentwood held their first meeting last February, with eight members present. Plans are going ahead for a workshop-studio. At the moment most of the constructional work involves concrete mixers and shovels!
Hon. Secretary: Miss Patricia Clampin, c/o 149, Ongar Road, Brentwood, Essex.

Chelmsford are holding occasional meetings during the summer months to discuss future activities. Several members have left Chelmsford recently, and new ones arrived. September 6th will see the group in action in London at the Mobile Rally in Battersea Park.
Hon. Secretary: Arthur Butcher, G3KPJ, Rectory Cottage, West Hanningfield, Chelmsford, Essex

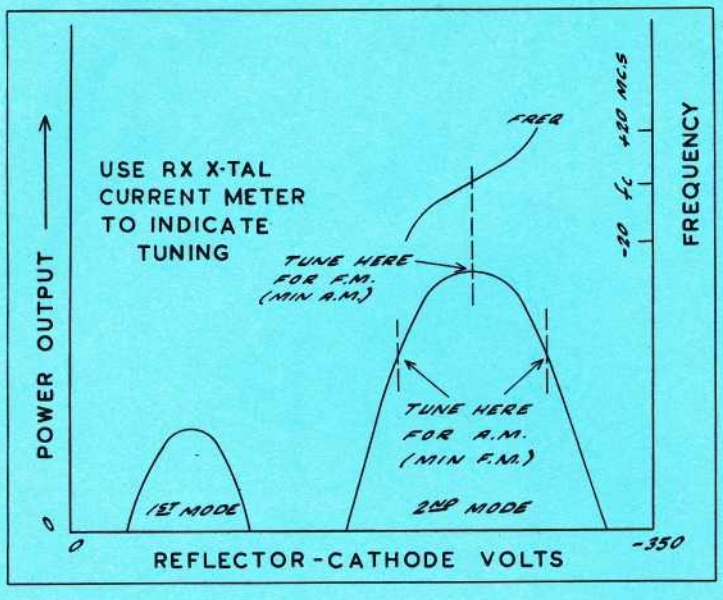
Cambridge are also quiet during the summer, Mike Soames writes with the news that Roger Oldfield is in Bermuda for a few years and that several other members are due to be called up for National Service or are too busy with exams. It is hoped that Matilda will be at the Rally on September 6th, in full running order.
Hon. Secretary: Mike Soames, 61, Chesterton Rd Cambridge.

Yeovil are still severely handicapped by the loss of all the gear in the fire some 18 months ago, but Alan Stacey is getting started again on another F.S.S. and a 5527 camera. Pluff Plowman is pushing on with the slow scan gear and an all-band 'steam radio' transmitter.

R.A.F. Locking (Weston-super-Mare) write with the news that activity is on the increase, although the actual members are constantly changing. A vision transmitter is well on the way and all that will be required soon is a receiving station!

High Wycombe have not sent in much news this time as Rex Lakeman has been ill, but we gather that the camera is now in the Mk.11 stage.

Change of Address
D.L.Jones, G3LYF/T,
Conce Farm, Bugle, St Austell, Cornwall.
F.Constable, Greenways, Foxley Drive, Bishop's Stortford, Herts.
Alan Sherman, 53 Gloucester Rd., Brentwood, Essex.
B.F.Wright, 19 Wainwright Avenue, Hutton, Brentwood, Essex.
Peter Bendall, G3NBU/T, 107 Mawson Rd., Cambridge.
Capt. J.A.Cusdin, 58 Gilda Crescent, Polegate, Sussex.
Roger Oldfield, c/o Messrs Young, Trott & Co. Ltd, Hamilton, Bermuda.



These two diagrams complete the article in CQ-TV 39 on: 'Microwave Links' by M.Barlow.